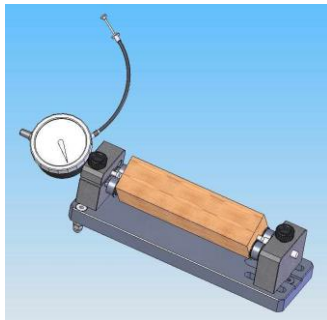


## Operating instructions

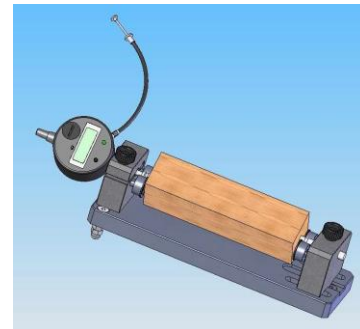
### Shrinkage Measuring Equipments DIN 52450

analog dial indicator

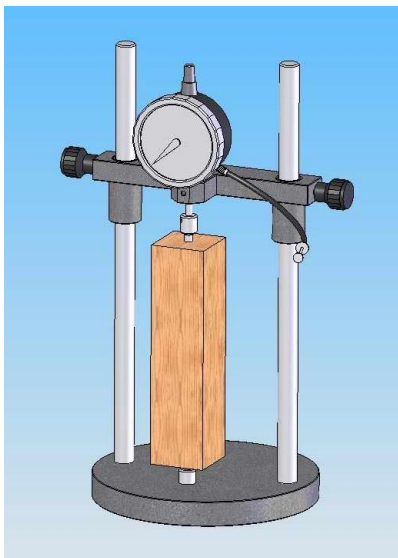


1.0228 Type C

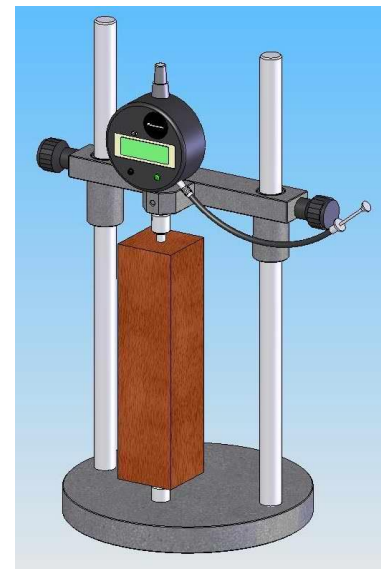
digital dial indicator



1.0228.10 Type C



1.0228.04 Type B



1.0228.07 Type B

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## **1 Test execution**

### **1.1 Nature of the process**

This test is applicable for determining the shrinkage and expansion of inorganic building materials with a constant structure after inspection. The process is applicable for test samples measuring 40x40x160 mms, whose aggregate grains or pores are not larger than 4 mms.

The test occurs with a dial indicator where two measuring plugs which are inserted in the long axis of the rotating test sample.

With the Model C measuring equipment the sample, when tilted, presses its measuring plug onto the dial indicator plunger.

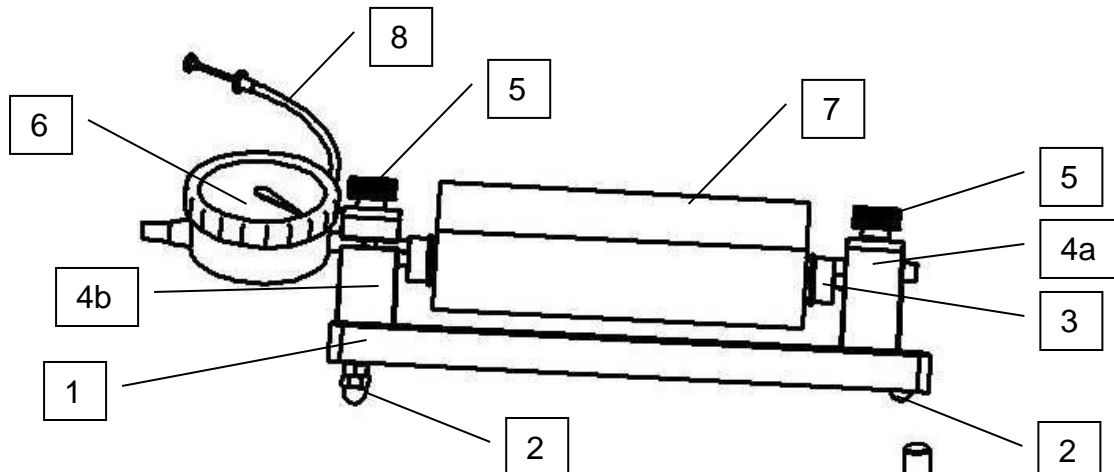
With the measuring instrument type B the position of the sample is vertical.

### **1.2 Test specification**

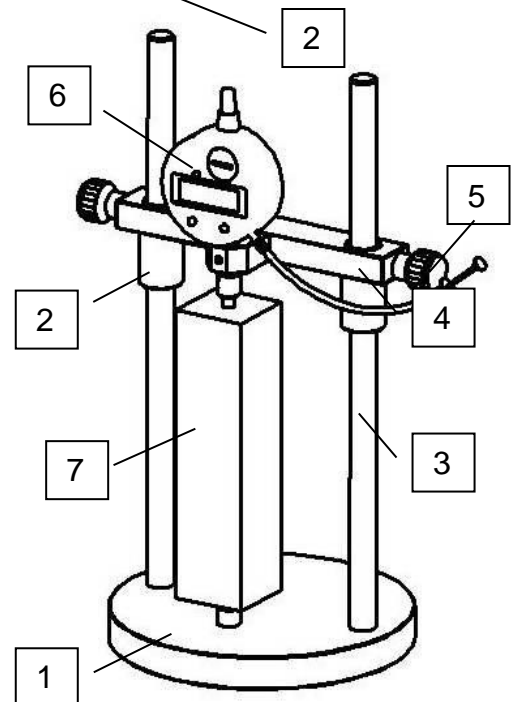
German Institute for Standardization 52450: Determination of Shrinkage and Expansion in small test samples

### 1.3 Technical equipment manual

1	steel base plate 1.3912 according to the German Institute for Standardization 17007-2
2	feet, three pieces
3	spherical storage tubes, stainless steel
4	bearing bracket
5	Tightening screw
6	dial indicator with cable release Scale division values 0,001 mms 1.0228 / 1.0228.04 Measuring range 5 mm 1.0228.07 / 1.0228.10 Measuring range 12,7 mm, RS 232
7	Sample / reference body
8	Release for dial gauge



1	Base plate
2	Mount of the gauge, with height adjustment
3	Supporting column Steel class 1.3912, in accordance with DIN 17007-2
4	Horizontal support
5	Tightening screw




## 1.4 Test Execution

### 1.4.1 Conditions

- Ensure that the temperature is the same in the room in which testing is conducted and in the storage space of Swell and Shrinkage Measuring Device.
  - Do not remove any of the test specimens from their storage container until just immediately before the measurements are to be conducted.
  - Clean the measuring pins (which hold the test specimen).
  - The time from the removal of the test specimen from its container and its placement of the specimen into the Swell and Shrinkage Measuring Device must not be longer than 2 minutes.
  - Ensure for every measurement that the position of the test specimen in the device is exactly the same.
  - Ensure that the actual test itself is conducted as fast as possible.
  - Calibration measurements should be conducted, and the measuring procedure should be checked for correctness.
  - After completion of testing, return the test specimen to its storage container.
- 
- To begin testing, retract the gauge tappet by using the cable release.
  - Then carefully place the test specimen onto the measuring pan.
  - Then use the cable release to carefully press the gauge tappet onto the measuring pin, and allow the spring force from the gauge alone to press it into place.
  - Turn the test specimen around on its longitudinal axis.
  - Read off the measured values to a precision of 0.001 mm, and determine the change in length with reference to the initial value.

### 1.4.2 Setting up the Device

- Set the device up as has been shown in the illustration
  - Screw the cable release into the dial gauge
  - Place the object to be compared into the testing device
  - Slide the dial gauge with the shaft into the middle drilled hole of the left-hand bearing pedestal (see the diagram)
  - Model 1.0228 / 1.0228.04: Push the dial gauge with the measuring sensors against the measuring pegs of the object to be compared, so that the smaller pointer of the inner semi-circular scale displays, as an example 3 mm (a maximum of 5 mm is possible). In this position, the measurement of expansion of a distance of up to 2mm is possible and shrinkage of up to 3mm may be measured
- 
- Clamp the dial gauge (6) to the shaft using the knurled screws

- Set the dial gauge to “0” by turning the outer ring (setting the initial value)



- Rotate the comparison object around the longitudinal axis to determine any possible distortion of the object. Large fluctuations of the pointer would indicate distortions. There should be no fluctuations greater than  $\pm 1/2$  of the scale interval (0.0005 mm) shown on the dial gauge.
- Remove the measurement sensors from the measuring pegs of the comparison object by inserting the cable release into the shaft.

Attention	<u>Every time, before removal and before inserting</u> either a comparison object or a proof object, move the measurement sensors with the release cable into the shaft and then lift away from the measurement pegs so that the sensors are not damaged!
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- Take the comparison object out of the device
- Release the cable release mechanism

### 1.4.3 Carrying out the Measurement

- Take the test object out of the storage container
- Clean any adhesive foreign objects from the measuring pegs
- Slide the measurement sensors by pressing on the cable release mechanism far enough into the shaft so that the test object can be inserted without touching the measurement sensors
- Position the test object carefully with one measuring pin on the fixed measuring surface of the right-hand bearing pedestal (see the diagram) and place on the rollers. Release the cable release mechanism carefully. The elasticity of the dial gauge causes the measuring sensors to press against the measuring pins
- Rotate the test object around the longitudinal axis, to determine any possible distortion of the test object. Large fluctuations of the pointer would indicate distortions. There should be no fluctuations greater than  $\pm 1/2$  of the scale interval (0.0005 mm) shown on the dial gauge
- Take measurements to an accuracy of 0.001 mm and take and note down any variations in length in comparison to the initial value “0”. (The variation in length is

taken in relation to the measuring length and is converted to mm/m (x mkm/ 160 mm= y mm/m) and rounded off to 0.01 mm/m.)

- Move the measurement sensors by pressing on the cable release mechanism far enough into the shaft so that the test object can be extracted without touching the measurement sensors
- After measurement, return the test specimen back to the storage container.
- Control measurements on the comparison object should be taken before and after measurements on the test object are taken and, if necessary, measurement calibration should be checked, or the difference should be considered when performing the evaluation.
- It is recommended that the test object should be weighed to an accuracy of 0.1g after every measurement, to determine the amount of water absorption or water release. With knowledge of the mass that is measured at this time,  $m_t$ , the additional – for example at the end of the test – dry mass  $m_d$  and the volume of the test body  $V$ , the actual moisture content  $h_{v,t}$  can be calculated by using

$$h_{v,t} = (m_t - m_d) \times 100/V \quad \text{in \%} \quad .$$

$m_t$  = The mass at time point t

$m_d$  = Dry mass

$V$  = Volume of the test specimen

$h_{v,t}$  = Moisture content at time point t

This procedure complies with DIN 52450.

## 2. Receiving the system from the forwarding agent

When the system arrives from the forwarding agent, make an external inspection. If there are no visible damages or other shortcomings, accept the consignment from the freight forwarder (the package service or a haulage agent).

If there are no transport damages or other shortcomings, use the bill of delivery to check to make sure that the delivery is complete.

If you believe that transport damage may have taken place when you receive the equipment, or if you discover after you have accepted the delivery that damage has occurred, immediately make a report of this damage, with an exact description of the nature and the extent of the damage. Send this report to us immediately by fax. Important: Be sure not to make any changes or other alterations to the system as it has been delivered.

When we receive this report, we shall decide whether we can solve the difficulty by one of the following steps:

- Delivery to you of spare parts
- Sending a specialist fitter or mechanic to your company
- Asking for return of the system to us for replacement or repair.

## 3. Guarantee

Our **General Terms of Sales and Delivery** apply in all cases.

The Manufacturer guarantees that this Operating Manual has been prepared in conformity with the technical and functional parameters of the Cabinet as delivered. The Manufacturer reserves the right to add supplementary information to this Operating Manual as required.

The guarantee provided by the Manufacturer is the legal guarantee. This guarantee does not cover wear-and-tear parts.

The Manufacturer guarantees trouble-free operation only if the User observes the instructions in this Operating Manual, and only if the User employs the Cabinet for the purpose for which it is intended.

The Manufacturer shall not be liable for damages that may occur if the Cabinet is used for purposes for which it is not intended, or if the User does not observe the instructions and rules for operation as set forth in this Operating Manual.

No claims for damages may be lodged against the Manufacturer if the Cabinet is modified in its structural or constructional characteristics without the prior written consent of the Manufacturer, or if its functional characteristics are modified without such consent.

## **4. After-sales service and spare parts**

A great deal of care has been taken to ensure that this Operational Manual is correct. We cannot, however, guarantee that it is without mistakes or errors, or that all information contained herein will continue to remain valid in the event of technical changes.

### **4.1 Date of issue of this Operational Manual**

Edition no. 5  
Date of issue: Apr. of 2020

### **4.2 Copyright**

The copyright to this Operational Manual remains with the company

**TESTING** Bluhm & Feuerherdt GmbH.

This Operational Manual is intended only for the Operator, the User, and his staff. The information in this Operational Manual may not be:

- Reproduced, or
- Distributed, or
- Provided to any other persons.

Any person acting in violation of the above stipulations may be prosecuted before a court of law.

### **4.3 Contact for help and spare parts**

If you have any technical questions, or if you require spare parts, please get directly in touch with the following address:

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Fax: +49 / 30 / 710 96 45-98  
E-mail: [info@testing.de](mailto:info@testing.de)  
[www.testing.de](http://www.testing.de)